AHT / BEVA / DEFRA
Equine Quarterly Disease Surveillance Report

Volume: 14, No. 2
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HIGHLIGHTS IN THIS ISSUE

News Articles

- An update on the Equine Herpes Virus outbreak status in France
- Information about the best practice worm control following discontinuation of Equitape

Focus Article

- Antimicrobial Resistance in Horses

Important note:
The data presented in this report must be interpreted with caution, as there is likely to be some bias in the way that samples are submitted for laboratory testing. For example they are influenced by factors such as owner attitude or financial constraints or are being conducted for routine screening as well as clinical investigation purposes. Consequently these data do not necessarily reflect true disease frequency within the equine population of Great Britain.

Table of contents

Welcome to the second quarterly equine disease surveillance report for 2018 produced by the Department for Food, Environment and Rural Affairs (Defra), British Equine Veterinary Association (BEVA), Animal & Plant Health Agency (APHA) and the Animal Health Trust (AHT).

The national disease data is collated through multiple diagnostic laboratories and veterinary practices throughout the United Kingdom, providing a more focused insight into the occurrence of equine infectious disease. Due to the global mixing of the equine population through international trade and travel, collaboration on infectious disease surveillance between countries occurs on a frequent basis to inform and alert. Both national and international information will be summarised within this report.

To receive reports free of charge, via e-mail, on a quarterly basis, register your details at: http://www.aht.org.uk/cms-display/DEFRA_AHT_BEVA_equine_reports.html

In this issue, the focus article is by Cajsa Isgren and Dr Gina Pinchbeck from University of Liverpool on

Antimicrobial Resistance in Horses

If any hospital has a suspected outbreak of multi-drug resistant E. coli from surgical site infections, University of Liverpool will receive and process samples **free of charge** and feedback results. For more information please contact Cajsa Isgren cisgren@liverpool.ac.uk

Current national and international disease outbreaks since 1st July 2018

National Disease Occurrence

EQUINE HERPES VIRUS-4 (EHV-4) RESPIRATORY INFECTION

On 4 July 2018, Animal Health Trust (AHT) confirmed a case of EHV-4 respiratory disease on a premises in Devon, England. The affected animal was an unvaccinated six-year-old mare that presented with pyrexia, inappetance, lethargy, coughing, nasal discharge and mildly swollen lymph nodes on 27 June 2018. The other two horses on the premises are not affected. The positive diagnosis was confirmed by PCR on a nasopharyngeal swab.

On 13 July 2018, AHT confirmed a case of EHV-4 respiratory infection on a premises in Yorkshire. The affected animal was an unvaccinated 15-year-old that presented with chronic lower airway disease. The diagnosis of EHV-4 infection is considered of undetermined clinical significance in this chronic case. The positive diagnosis was confirmed by PCR on a nasopharyngeal swab.

International Disease Occurrence

BOTULISM (*Clostridium botulinum*)

Canada
On 2 July 2018, an outbreak of botulism was confirmed by the attending veterinarian on a premise in Chester Basin, Nova Scotia, Canada. A 12-year-old Arabian cross Quarter Horse gelding and a 26-year-old Arabian gelding were euthanased. Three additional horses, an eight-year-old Standardbred mare and seven and 10-year-old donkey jacks presented with difficulty in swallowing, muscle fasiculations and recumbency. Of these, one also exhibited a stiff gait and another also presented with colic. A total of eight to ten horses have been exposed.

CONTAGIOUS EQUINE METRITIS (CEM) (*Taylorella equigenitalis*)

France
On 3 July 2018, Réseau d'Epidémio-Surveillance en Pathologie Equine (RESPE) reported a confirmed case of CEM on a stud premises in Cotes-d'Armor, France. The clinical infection was detected based on bacteriology on a uterine swab taken from a 14-year-old Oldenburg mare that demonstrated signs of purulent metritis following artificial insemination with frozen semen. The positive result was confirmed by the Dozulé Laboratory for Equine Diseases on 28 June 2018.

There are two other geldings on the affected premises and the affected mare has been isolated and treatment started.

EASTERN EQUINE ENCEPHALOMYELITIS (EEE)

USA
There were a total of 16 confirmed cases in July 2018.

Table 1: Eastern Equine Encephalitis outbreaks reported in USA for July 2018

Location	*Report Date*	*Signalment*	*Vaccinated*	*Further information*	*Source*
Okeechobee County, FL	2 July	6mo Tennessee Walking Horse	No	Euthanased	FL Department of Agriculture
Osceola County, FL	3 July	4yo Miniature Horse	No	Euthanased	FL Department of Agriculture
Richmond County, NC	9 July	4yo Quarter Horse	Yes	None	NC Department of Agriculture
Union County, FL	10 July	2yo Quarter Horse	No	Euthanased	FL Department of Agriculture
Jackson County, FL	10 July	1yo Paso Fino	No	Euthanased	FL Department of Agriculture
Onslow County, NC	11 July	13yo Draft cross	NK	None	NC Department of Agriculture and Consumer Services
Union County, FL	17 July	2yo Quarter Horse	No	Euthanased	FL Department of Agriculture
Polk County, FL	17 July	1yo Paso Fino	No	Euthanased	FL Department of Agriculture
Suwanee County, FL	18 July	3yo Quarter Horse	NK	Euthanased	FL Department of Agriculture
Clay County, FL	20 July	1yo Warmblood	NK	Euthanased	FL Department of Agriculture
Houston County, AL	25 July	NK	NK	Euthanased	AL Department of Agriculture
Mobile County, AL	25 July	NK	NK	Euthanased	AL Department of Agriculture
Geneva County, AL	25 July	NK	NK	None	AL Department of Agriculture
Onslow County, NC	26 July	5yo	Yes	Euthanased	NC Department of Agriculture
Washburn County, WI	27 July	6yo Belgian	No	Euthanased	WI Department of Agriculture
Duplin County, NC	30 July	1yo Donkey	No	None	NC Department of Agriculture

yo = year old, NK = not known

EQUINE HERPES VIRUS–1 (EHV-1) RESPIRATORY INFECTION

Belgium
On 21 July 2018, Equi Focus Point Belgium (EFPB) reported two cases of EHV-1 respiratory disease. The first was confirmed in Anvers, with no further details available. The second case was confirmed in Gand and the affected animal has also been diagnosed with strangles. For both cases, the positive diagnoses were confirmed by Zoolyx Laboratories.

France
On 19 July 2018, RESPE reported a single case of EHV-1 respiratory infection on a stud in Calvados, France. The positive diagnosis was confirmed by PCR on a nasopharyngeal swab by LABEO-Frank Duncombe on 18 July 2018. No further details are available for this case.

EQUINE HERPES VIRUS-1 (EHV-1) NEUROLOGICAL DISEASE

Canada

On 13 July 2018, the Canadian Animal Health Surveillance System confirmed a case of EHV-1 neurological disease in Saskatchewan, Canada. The affected animal was an unvaccinated 19-year-old Quarter Horse gelding that presented with hindlimb ataxia. The index case tested negative on PCR but showed a high antibody titre for EHV-1/-4 on ELISA. The other six horses on the premises tested negative and none have been moved off the premises since the diagnosis was made, however, the positive horse was present at a roping/rodeo event in Alberta just prior to the diagnosis.

USA

On 2 July 2018, The California Department of Food and Agriculture reported a case of EHV-1 neurological disease in a 15-year-old pony mare in San Mateo County. Another horse at the premises was pyrexic and subsequently tested positive for EHV-1. Quarantine measures have been imposed on the affected premises and all exposed horses are being closely monitored.

On 9 July 2018, the Nebraska State Veterinarian's Office received a report of a neurological horse that tested positive for EHV-1 in Buffalo County, NE. The horse has been euthanased and the facility is currently under voluntary quarantine with appropriate biosecurity in place.

EQUINE HERPES VIRUS–4 (EHV-4) RESPIRATORY INFECTION

France

Table 2: EHV-4 respiratory disease outbreaks reported in France for July 2018 (source – RESPE)

French department	*Report Date*	*Clinical signs*	*Vaccinated*	*Total affected*	*In-contacts*
Calvados	2 July	NK	NK	4	NK
Eure	2 July	NK	NK	1	NK
Abas-Rhin	6 July	Coughing ND Pyrexia	No	1	1
Vosges	9 July	NK	NK	1	NK
Morbihan	11 July	NK	NK	2	NK
Calvados	11 July	NK	NK	8	NK
Ill-et-Vilaine	16 July	ND Oedema Pyrexia	No	1	29
Manche	23 July	ND Pyrexia	NK	1	NK

NK= not known

For all cases, positive diagnosis was confirmed by PCR on a nasopharyngeal swab

EQUINE INFLUENZA (EI)

Germany

On 3 July 2018, Laboratory Dr. Böse GmbH reported an outbreak of equine influenza in the German state of Bavaria. Five non-vaccinated non-Thoroughbred stallions on one premises showed clinical signs of pyrexia and nasal discharge. Positive diagnoses were made by PCR on nasal swabs.

EQUINE INFECTIOUS ANAEMIA (EIA)

Canada

On 28 June 2018, the Canadian Food Inspection Agency's (CFIA) national reference laboratory confirmed a case of EIA on a premises in Ponoka County, Alberta. The horse had been sampled by an accredited veterinary surgeon to comply with United States' import requirements. No clinical signs of disease were noted at the time of sampling. A CFIA investigation is underway and as per program policy, a quarantine has been placed on the infected animal and the contact animals on the premises. The quarantine will remain until all disease response activities have been completed, including follow-up testing and ordering the destruction of positive cases.

On 20 July 2018, CFIA's national reference laboratory confirmed a case of EIA in the rural municipality of Great Bend, Saskatchewan. The horse had been sampled by an accredited veterinarian to satisfy a pre-entry requirements. Initial

reports indicate that this horse has travelled extensively within the province. No clinical signs of disease were noted at the time of sampling. A CFIA investigation is underway.

France
On 18 July 2018, RESPE reported a single clinical case of EIA in Vaucluse, France. The affected animal, one of five on the affected premises, was a 21-year-old Saddlebred gelding used for leisure activity that presented with rapid weight loss, anaemia, fever and oedema on 5 June 2018. The diagnosis was confirmed on 12 July 2018 on the basis of antibody detection in blood (test type not specified). The affected horse has been euthanased and an epidemiological investigation implemented, with restrictions placed on the affected premises and screening testing being conducted.

On 26 July 2018, RESPE reported another case of EIA in Vaucluse, France, at a separate premises that is epidemiologically linked to the first case reported on 18 July 2018. The case was confirmed positive during serological screening tests and is an 11-year-old Saddlebred gelding. Both premises are under surveillance (one in Gard and one in Drôme department).

USA
The Oklahoma Department of Agriculture (ODAFF) has confirmed the first EIA positive horse for 2018 in Oklahoma. The 16-year-old Quarter Horse mare was euthanased and the premises in Kay County has been placed under quarantine. The mare had been recently purchased from an Alabama sale barn without a current Coggins (agar gel immunodiffusion; AGID) test and then sold to a rescue facility in Oklahoma.

On 10 July 2018, the Maryland Department of Agriculture confirmed one case of EIA in Montgomery County. The positive horse was discovered during a routine examination by a private veterinarian. The affected animal was not displaying any clinical signs and will be euthanased. The positive diagnosis was confirmed by the National Veterinary Services Laboratory. The State Veterinarian's Office has placed the facility under quarantine and will retest all in-contacts after 60 days.

On 13 July 2018, Texas Animal Health Commission (TAHC) officials confirmed EIA in one Standardbred horse in Dallas County and in one Quarter Horse in McLennan County, Texas. Both horses were euthanased and the premises will remain under quarantine until requirements for release have been met.

Potomac Horse Fever (*Neorickettsia risticii)* (PHF)

USA
On 29 July 2018, an attending veterinarian confirmed four cases of Potomac Horse Fever at an equine clinic in Albemarle, VA. The cases included Quarter Horses and Miniature Horses ranging in ages from 10 to 14 years old and were confirmed on fecal and blood PCR. Onset of clinical signs was reported on 23 July 2018 and include pyrexia, lethargy, diarrheoa, and inappetance. One horse was euthanased, the remaining three cases are receiving treatment. The horses are reported as having been vaccinated.

WEST NILE VIRUS (WNV)

Greece
On 18 July 2018, the World Organisation for Animal Health (OIE) reported a single subclinical case of WNV among four horses on a premises in Thessaloniki, Central Macedonia, Greece as part of active surveillance. The positive diagnosis was confirmed by IgM capture ELISA on 11 July 2018 by the Department of Molecular Diagnostics at the Directorate of Athens Veterinary Centre. The source of the outbreak is unknown. Control measures implemented include movement restrictions within the country, contact tracing, control of vectors and vaccination.

USA
On 27 July 2018, The Idaho Department of Agriculture confirmed a case of West Nile Virus in a two-year-old Quarter Horse mare located at a private facility in Owyhee County. The horse showed an onset of clinical signs on 19 July 2018 including ataxia and incoordination. Testing was confirmed positive for WNV at the ISDA Animal Health Laboratory. The horse had been vaccinated as a filly but had not received a booster vaccination. The horse was improving with supportive care.

News Articles

An update on the Equine Herpes Virus outbreak status in France

Increased vigilance by the RESPE crisis team has been ongoing since the increased number of EHV cases diagnosed in France over the last four months. The majority of these cases have been in north eastern France, with most positive cases having been individual animals affected by the respiratory form of the disease.

The RESPE team feels that increased surveillance on a whole is partly responsible for the increase in numbers of positive cases being diagnosed, with 37 outbreaks of EHV-1 infection and 50 outbreaks of EHV-4 having been diagnosed between 15 March 2018 and 14 June 2018.

As of 14 June 2018, increased awareness and uptake of sampling of suspect cases and implementation of prevention measures have apparently been effective in limiting the spread of the disease.

RESPE cautions, however, that even if the situation seems stable and under control, the risk cannot be considered completely eliminated.

Recommendations, including good hygiene practices at equine gatherings remain relevant with the crisis unit strongly encouraging the maintenance of precautionary measures. Weather conditions currently are considered favourable for continued circulation of EHV and so it seems premature to reduce these measures, with certification of good health still being a minimum requirement for attendance at events and competitions.

Detailed recommendations are available at http://respe.net/system/files/20180525_mesures_prévention.pdf (French language document)

Information about the best practice worm control following discontinuation of Equitape

BEVA have released a statement regarding the discontinuation of Equitape® (commonly used to treat tapeworm infection) from sale in the UK from **October 2018**.

This wormer is the only licenced product for horses containing praziquantel as a single active ingredient. Going forward it will only be available in 'combination wormers' also containing either ivermectin or moxidectin, the drugs most commonly used to treat small and large redworms (strongyles). Equitape's removal from the portfolio of veterinary medicines available to target specific worm infection presents a challenge to prescribers and horse owners alike.

Two leading laboratories; Westgate Labs, postal worm count specialists, and Austin Davis Biologics, manufacturers of the innovative EquiSal tapeworm test, are therefore responding to this news to stress the increasing importance of evidence-based control in managing worm burdens in horses. In partnership with Professor Jacqui Matthews, Royal College of Veterinary Surgeons Specialist in Veterinary Parasitology and Parasitology Expert on the UK Veterinary Products Committee, they have set out to develop "best practice" recommendations to minimise the impact of the impending change in wormer products available for tapeworm treatment and control.

The full BEVA news article, including the best practice recommendations is available at:
https://www.beva.org.uk/Home/News-Archive/entryid/1000/best-practice-worm-control-advice-following-discontinuation-of-equitape-horse-wormer-in-october-2018

VIROLOGY

disease report for the second quarter 2018

The results of virological testing for April to June 2018 are summarised in Table 3 and include data relating to Equine Viral Arteritis (EVA), Equine Infectious Anaemia (EIA) and West Nile Virus (WNV) from the Animal & Plant Health Agency (APHA), Weybridge. The sample population for the APHA is different from that for the other contributing laboratories, as the APHA's tests are principally in relation to international trade (EVA, EIA and WNV). APHA now also provides testing for WNV as part of clinical work up of neurological cases, to exclude infection on specific request and provided the local regional APHA office has been informed. No equine viral notifiable diseases have been confirmed in the UK during this second quarter of 2018.

Table 3: Diagnostic virology sample throughput and positive results for the second quarter of 2018

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
Serological Tests			
EVA ELISA	2744	56#	9
EVA VN	403	174#	2
EVA (APHA) VN	378	23#	1
EHV-1/-4 CF test	451	14*	1
EHV-3 VN test	3	1	1
ERV-A/-B CF test	211	1*	1
Influenza HI test	111	0*	1
EIA (Coggins)	150	0	2
EIA ELISA	1825	0	8
EIA (APHA) (Coggins)	634	0	1
WNV (APHA) (cELISA)	1	0	1
Rotavirus ELISA	126	24	3
Virus Detection			
Coronavirus PCR	33	4	1
Rotavirus strip test	30	1	2
EHV-1 PCR	535	18	5
EHV-4 PCR	534	16	4
EHV-1 VI	56	15	1
EHV-4 VI	56	6	1
EHV-2 PCR	24	4	1
EHV-5 PCR	24	5	1
Influenza PCR	269	1	3
Influenza (APHA) PCR	105	0	1
Influenza VI in eggs	1	0	1
EVA VI/PCR	14	0	1
EVA (APHA) VI/PCR	2	0	1
WNV (APHA) PCR	1	0	1

ELISA = enzyme-linked immunosorbent assay, VN = virus neutralisation, CF = complement fixation, HI = haemagglutination inhibition, Coggins = agar gel immune diffusion test, PCR = polymerase chain reaction, VI = virus isolation, EVA = equine viral arteritis, EHV = equine herpes virus, ERV = equine rhinitis virus, EIA = equine infectious anaemia, WNV = West Nile Virus, # = Seropositives include vaccinated stallions, * = Diagnosed positive on basis of seroconversion between paired sera

Time period: 1 April to 30 June 2018

EQUINE HERPES VIRUS-1 (EHV-1) ABORTION

There were a total of five confirmed cases from four outbreaks

On 1 April 2018, Rossdales Laboratories, Newmarket confirmed a third case of EHV-1 abortion on a premises in Suffolk, on which previous cases had been confirmed on 7 and 26 March 2018 (see page 11 of Q1 DEFRA report). The affected animal was a vaccinated Thoroughbred mare. The positive diagnosis was confirmed by post mortem examination and PCR on fetal and placental tissues.

On 1 April 2018, AHT confirmed a case of EHV-1 abortion on a premises in Sussex. The affected animal was a vaccinated non-Thoroughbred mare. On 7 April, AHT confirmed a second case of EHV-1 abortion on this premises. The affected animal was a vaccinated non-Thoroughbred mare. Another abortion was reported on 11 April at the premises but no confirmatory testing has been performed. On 13 April, AHT confirmed another case involving a congenitally infected foal that died at 36 hours old. The dam was a vaccinated non-Thoroughbred mare. On 26 April, a congenitally infected foal died at one-hour-old. For all four confirmed cases, the positive diagnoses were made by post mortem examination and PCR on fetal and placental tissues. In summary, the premises has had three abortions and two neonatal foal deaths.

On 17 April 2018, AHT confirmed a case of EHV-1 neonatal infection on a premises in Staffordshire. This case is linked to an EHV-1 neurological case reported on 27 March 2018 (see page 11 of Q1 DEFRA report). The affected animal was a 48-hour-old foal born to an unvaccinated dam. Two other mares on the premises have foaled healthy foals since the index neurological case and one mare was still to foal. The positive diagnosis was confirmed by post mortem examination and PCR on tissues.

On 24 April 2018, AHT confirmed a case of EHV-1 abortion on a premises in Berkshire. The affected animal was an unvaccinated non-Thoroughbred. The positive diagnosis was confirmed by PCR on fetal and placental tissues. No further details are available at this time.

EQUINE HERPES VIRUS-1 (EHV-1) RESPIRATORY INFECTION

On 11 May 2018, AHT confirmed an outbreak of EHV-1 respiratory infection on a premises in Essex, United Kingdom. There were a total of three confirmed cases with a further three in contacts. The affected animals were unvaccinated and they presented with serous nasal discharge, lymphadenopathy and lethargy a few days after attending a show. The positive diagnoses were confirmed by PCR on nasopharyngeal swabs.

EQUINE HERPES VIRUS-4 (EHV-4) RESPIRATORY INFECTION

Table 4: EHV-4 respiratory disease cases reported in the UK for the second quarter 2018 (source – AHT)

Location	*Report Date*	*Clinical signs*	*Vaccinated*	*Total affected*	*In-contacts*	*Sample*	*Diagnostics*
Sussex	6 April	ND Pyrexia	NK	1	NK	NP swab	PCR
Yorkshire	6 April	ND Pyrexia	No	1	NK	NP swab	PCR
Buckinghamshire	17 May	ND	No	4	NK	NP swab	PCR
Norfolk	25 May	Coughing ND Pyrexia	No	1	NK	NP swab	PCR

NK= not known, NP = nasopharyngeal, PCR = polymerase chain reaction, ND = nasal discharge

EQUINE INFLUENZA (EI)

On 17 April 2018, AHT confirmed a case of EI on a single premises in Oxfordshire. The affected animal was a vaccinated 13-year-old Warmblood gelding that presented with a cough and mild serous nasal discharge but was non-pyrexic. There were a total of 50, asymptomatic in-contacts at the premises, with six direct in-contacts testing negative by qPCR on nasopharyngeal swabs. Biosecurity measures were implemented, including isolation of the affected animal and voluntary movement restrictions. The positive diagnosis was confirmed by qPCR on a nasopharyngeal swab which demonstrated a low positive result.

HBLB Surveillance Scheme
Animal Health Trust can test a nasopharyngeal swab and paired blood samples from suspected cases of equine influenza **FREE OF CHARGE** in our diagnostic laboratories, funded by the HBLB. Enter your details at http://www.aht.org.uk/cms-display/equiflunet_register.html to sign up and AHT will send you sampling kits, including swabs and submission forms.

Tell-Tail Text Message Alert Scheme
In the case of an outbreak, notification will be reported by the text alert service (Tell-Tail) for UK equine practitioners sponsored by Boehringer Ingelheim. This free of charge service alerts practitioners to outbreaks of equine influenza, equine herpes abortion and equine herpes neurological disease in the UK via text message. Sign up to receive alerts at https://telltail.co.uk/

INTERNATIONAL VIRAL DISEASE OCCURRENCE

Time period: 1 April to 30 June 2018

AFRICAN HORSE SICKNESS (AHS)

Swaziland
On 12 April 2018, the OIE reported a case of AHS on a premises in Hhohho region, Swaziland. This index case presented with clinical signs on 15 March 2018 and was amongst a group of 46 susceptible animals. The premises is located in a game reserve where the horses are in close proximity to wild equids. The last reported occurrence of AHS in this region was 31 August 2017. Control measures implemented include; movement restrictions within the country, quarantine and vector control. The positive diagnosis was confirmed by ELISA on 4 April 2018 by Onderstepoort Veterinary Institute (OVI), South Africa (OIE Reference Laboratory).

EASTERN EQUINE ENCEPHALITIS (EEE)

USA
There were a total of 21 confirmed cases by Florida Department of Agriculture

Table 5: Eastern Equine Encephalitis outbreaks reported in USA for the second quarter 2018

Location	*Report Date*	*Signalment*	*Vaccinated*	*Further information*
Hamilton County, FL	18 April	17yo Welsh Pony	No	Euthanased
Marion County, FL	1 May	8yo Paso Fino	No	None
Putnam County, FL	1 May	3yo Quarter Horse	Yes	Euthanased
Nassau County, FL	3 May	4yo TB	No	Euthanased
Alachua County, FL	8 May	4yo Miniature Horse	No	Euthanased
Marion County, FL	16 May	1yo Miniature Horse	No	Euthanased
Marion County, FL	21 May	10yo TB	No	Euthanased
Marion County, FL	1 June	10yo Arabian	Yes	Euthanased
Nassau County, FL	2 June	3yo TB	Yes	Euthanased
Suwanee County, FL	4 June	2yo Trakehner	Yes	Euthanased
Putnam County, FL	8 June	7yo Paint Horse	No	Euthanased
Pasco County, FL	10 June	5yo Saddle Horse	No	Euthanased
Gilchrist County, FL	11 June	6yo Miniature Horse	No	Euthanased
Marion County, FL	12 June	5yo Pony	No	Euthanased
Suwanee County, FL	15 June	1yo TB	No	Euthanased
Volusia County, FL	16 June	2yo QH	No	Euthanased
Okeechobee County, FL	17 June	1yo Standardbred	Yes	Euthanased
Marion County, FL	19 June	2yo QH	NK	Euthanased
Volusia County, FL	21 June	4yo Donkey	Yes	Euthanased
Marion County, FL	21 June	1yo TB	Yes	Euthanased
Sumter County, FL	22 June	9yo QH	No	Euthanased

yo = year old, QH = Quarter Horse, TB = Thoroughbred NK = not known

EQUINE HERPES VIRUS-1 (EHV-1) ABORTION

Table 6: International EHV-1 abortion/neonatal infection cases reported for the second quarter 2018

Location	*Report Date*	*Breed*	*Vaccinated*	*Total affected*	*In-contact*	*Sample and diagnostics*	*Source*
Aisne, France	9 April	NK	NK	1	NK	Fetal Tissue, PCR	RESPE
Calvados, France	12 April	French Trotter	Yes	3	6	Fetal Tissue, PCR	RESPE
Calvados, France	24 April	French Saddlebred	NK	1	NK	Fetal Tissue, PCR	RESPE
Calvados, France	25 April	French Saddlebred	NK	1	NK	Fetal Tissue, PCR	RESPE
Zealand, Denmark	27 April	NK	NK	2	NK	Fetal Tissue, PCR	Chief Veterinary Surgeon
Calvados, France	4 May	NK	NK	1	NK	Congenitally infected foal, PCR	RESPE
Nordrhein-Westfalen, Germany	4 May	TB	Yes	1 linked to outbreak report on 12.01.18	100	Fetal Tissue, PCR	University of Hannover
Haute-Saône, France	14 May	NK	NK	1	NK	Fetal tissue, PCR	RESPE
Somme, France	16 May	French Saddlebred	No	1	NK	Fetal tissue, PCR	RESPE
Manche, France	1 June	NK	NK	2	NK	Fetal tissue, PCR	RESPE
Gard, France	1 June	Camargue	NK	1	2	Fetal tissue, PCR	RESPE

NK= not known, PCR = polymerase chain reaction

EQUINE HERPES VIRUS-1 (EHV-1) NEUROLOGICAL DISEASE

Denmark

On 27 April 2018, the Chief Veterinary Surgeon for Charlottenlund Trotting Track & Klampenborg Racing Track, Denmark, reported an outbreak of EHV-1 neurological disease affecting four separate premises. One outbreak was confirmed on a riding school in Funen with around 30% of the horses on the premises presenting with transient pyrexia and of these, two developed neurological signs. Two outbreaks were confirmed at separate private stables after some of the horses presented with pyrexia after attending an event at the index premises, quarantine restrictions have been put in place. An equine hospital in Funen has been treating two cases of EHV-1 neurological disease and these have been isolated. The premises of origin for these two cases have not been confirmed.

An update in June 2018 revealed that a total of 20 horses on five separate premises were affected. Three stables in Funen were affected with five horses with severe neurological signs requiring euthanasia. Thereafter there have been sporadic isolated incidents in Jutland and Seeland. Positive diagnoses were confirmed by PCR.

France

On 24 April 2018, RESPE reported a case of EHV-1 neurological disease on a premises in Sarthe, France. The positive diagnosis was confirmed by PCR on spinal cord tissue by LABEO-Frank Duncombe, Normandy.

On 18 May 2018, RESPE reported a case of EHV-1 neurological disease on a premises in Sarthe, France. The affected animal is a Thoroughbred that presented with neurological signs. The positive diagnosis was confirmed by PCR on a nasopharyngeal swab.

On 23 May 2018, RESPE reported a case of EHV-1 neurological disease on a stud premises in Ille-et-Vilaine, France. The affected animal was a vaccinated nine-year-old Thoroughbred mare that presented with lethargy and stiffness. There are four in contacts. The positive diagnosis was confirmed by PCR on a nasopharyngeal swab and the horse was also positive for EHV-4.

On 18 June 2018, RESPE reported a case of EHV-1 Neurological Disease on a premises in Mayenne, France. The affected animal is a Thoroughbred that presented with neurological signs. The positive diagnosis was confirmed by PCR on a nasopharyngeal swab by LABEO-Frank Duncombe.

Ireland

On 31 May 2018, The Irish Equine Centre confirmed four cases of EHV-1 neurological disease on a Thoroughbred stud farm in Leinster and two cases on a mixed farm (sport horses and Thoroughbreds) in Munster. Voluntary movement restrictions are in place and the horses on both premises are being monitored by PCR and serological testing.

USA

Table 7: EHV-1 neurological disease outbreaks reported in USA for the second quarter 2018 (source – Equine Disease Communication Center)

Location	*Report Date*	*Clinical signs*	*Vaccinated*	*Outcome*	*Total affected*	*In-contacts*
Washtenaw County, MI	3 April	Neurological signs	NK	NK	1	NK
Lincoln County, SD	12 April	Neurological signs	NK	NK	1	NK
Orange County, CA	13 April	Neurological signs	NK	NK	1	NK
Weld County, CO	23 April	Neurological signs	NK	Recovering	1	NK
Bowman County, ND	26 April	NK	NK	Euthanased	1	NK
Orange County, CA	1 May	Neurological signs	NK	NK	3	NK
Brookings, SD	4 May	NK	NK	NK	1	NK
Carbon County, WY	4 May	NK	NK	NK	1	NK
Montgomery County, TX	9 May	Neurological signs	NK	NK	1	NK
Lubbock County, TX	14 May	Ataxia Nasal discharge Pyrexia	NK	NK	1	NK
Fauquier, VA	18 May	Neurological signs	NK	NK	1	NK
Stutsman County, ND	18 May	Neurological signs	NK	Euthanased	1	NK
Williamson County, TX	31 May	Ataxia Nasal discharge	NK	NK	1	NK
Stutsman County, ND	1 June	Neurological signs	NK	Euthanased	1	NK
King County, WA	13 June	NK	NK	NK	1	NK

NK= not known

For all above outbreaks, facilities were placed under quarantine restrictions and all horses were being closely monitored. There is no further information regarding the tests performed to confirm a positive diagnosis.

EQUINE HERPES VIRUS-1 (EHV-1) RESPIRATORY INFECTION

Belgium

Table 8: EHV-1 respiratory infection outbreaks reported in Belgium for the second quarter 2018 (source – EFPB)

Location	*Report Date*	*Clinical signs*	*Vaccinated*	*Total affected*	*In-contacts*
Anvers	7 April	Coughing Dysphagia ND Pyrexia	No	1	NK
Gent	10 April	Coughing ND	No	1	NK
Bruges	10 April	Coughing ND	Yes	1	NK
Flandre occidentale	3 May	Coughing Lethargy ND Pyrexia	NK	1	NK
Gand	9 May	Coughing Lymphadenopathy ND	No	1	NK
East Flanders	18 May	Lethargy ND	No	1	NK
East Flanders	18 May	Lethargy Pyrexia	No	1	NK
Flandre occidentale	29 May	Pyrexia	No	1	NK
Aalter	1 June	ND	Yes	1	NK
East Flanders	28 June	Coughing ND	No	1	NK

NK= not known, ND = nasal discharge

For all cases, positive diagnosis was confirmed by PCR on a nasopharyngeal swab

France

Table 9: EHV-1 respiratory infection outbreaks reported in France for the second quarter 2018 (source – RESPE)

French department	*Report Date*	*Clinical signs*	*Vaccinated*	*Total affected*	*In-contacts*
Calvados	6 April	NK	NK	1	NK
Gironde	9 April	NK	NK	2	NK
Paris	9 April	NK	NK	4	6
Mayenne	13 April	NK	NK	1	NK
Charente-Maritime	4 May	NK	NK	1	NK
Manche	7 May	Pyrexia	No	1	NK
Charente-Maritime	9 May	Coughing ND	NK	1	NK
Côtes d'Armor	23 May	NK	NK	1	40
Pyrénées Atlantiques	23 May	NK	NK	1	NK
Sarthe	23 May	Lethargy Pyrexia	NK	2	NK
Sarthe	25 May	ND Pyrexia	NK	13	50
Haute-Garonne	31 May	Coughing ND Pyrexia	NK	2	60
Haute-Vienne	1 June	ND Pyrexia	NK	1	NK
Haute-Garonne	8 June	Subclinical	NK	1	Linked to 31 May report
Calvados	15 June	ND	NK	1	NK

		Coughing			
Haute-Loire	18 June	ND Pyrexia Coughing	No	1	80
Haute-Garonne	25 June	NK	NK	1	NK

NK= not known, ND = nasal discharge

For all cases, positive diagnosis was confirmed by PCR on a nasopharyngeal swab

USA

On 23 April 2018, The California Department of Agriculture and Consumer Services confirmed an outbreak of EHV-1 respiratory infection. There were two affected animals that both presented with pyrexia. They were housed in a quarantine barn in Orange County. Both horses were placed in separate isolation stabling on the property. Exposed horses on the facility were placed under quarantine.

On 23 April 2018, The Georgia Department of Agriculture confirmed a case of EHV-1 respiratory infection in a miniature mule located in Cherokee County. The mule died as a result of complications related to pneumonia. Quarantine restrictions have been placed on the property and exposed equines on the facility were monitored for any clinical signs.

On 10 May 2018, the Washington State Veterinarian's office was notified of a case of EHV-1 infection in a horse in King County. An A2254 strain (non-neuropathogenic) of the virus was detected from the animal. The affected animal was isolated and the premises was placed under quarantine.

EQUINE HERPES VIRUS-4 (EHV-4) ABORTION

France

On 9 April 2018, RESPE reported a single case of EHV-4 abortion on a premises in Ardennes, France. The positive diagnosis was confirmed by PCR on fetal tissues by LABEO-Frank Duncombe, Normandy, France.

On 4 May 2018, RESPE reported an outbreak of EHV-4 abortion on a riding school premises in Isère, France. The affected animal was a five-year-old pony. The positive diagnosis was confirmed by PCR on fetal tissues. One other abortion has been reported at the premises, with a total of 20 in contacts.

EQUINE HERPES VIRUS-4 (EHV-4) RESPIRATORY INFECTION

Belgium

On 28 June 2018, EFPB reported a case of EHV-4 on a premises in Ghent. The affected animal was unvaccinated and presented with nasal discharge and pyrexia. A co-infection with strangles was confirmed by PCR on a nasal swab.

France

Table 10: EHV-4 respiratory disease outbreaks reported in France for the second quarter 2018 (source – RESPE)

French department	*Report Date*	*Clinical signs*	*Vaccinated*	*Total affected*	*In-contacts*
Orne	19 April	NK	NK	1	NK
Mayenne	19 April	Pyrexia	Yes	1	70
Maine-et-Loire	19 April	Pyrexia ND	NK	1	NK
Calvados	27 April	Coughing Lethargy ND Pyrexia	NK	1	50
Cher	9 May	Coughing ND Pyrexia	NK	1	NK
Calvados	9 May	NK	NK	1	NK
Calvados	11 May	NK	NK	1	NK
Essonne	11 May	Coughing ND Pyrexia	No	2	30
Maine-et-Loire	14 May	Coughing	NK	1	NK

		Pyrexia			
Manche	14 May	Coughing	NK	2	NK
Manche	15 May	NK	NK	4	NK
Maine-et-Loire	16 May	Subclinical	NK	1	NK
Charente-Maritime	16 May	ND Coughing	No	4	20
Ariège	16 May	Subclinical	NK	NK	NK
Manche	16 May	Coughing ND Pyrexia	NK	1	NK
Orne	17 May	ND Pyrexia	No	10	NK
Loire-Atlantique	18 May	Pyrexia	No	1	20
Calvados	18 May	ND Pyrexia	NK	NK	NK
Seine-Maritime	18 May	Coughing ND Pyrexia	No	1	1
Tarn	18 May	Coughing ND Pyrexia	No	4	100
Finistère	18 May	NK	NK	NK	NK
Nord	18 May	NK	NK	NK	NK
Côte-d'Or	18 May	Coughing ND Pyrexia	No	2	50
Puy-de-Dôme	18 May	NK	NK	NK	NK
Gers	18 May	ND Pyrexia	NK	1	NK
Hérault	18 May	Coughing Dyspnoea Pyrexia	NK	1	NK
Tarn	23 May	Coughing ND Pyrexia	No	10	35
Manche	23 May	NK	NK	NK	NK
Pyrénées Atlantiques	23 May	None	NK	NK	NK
Isère	23 May	Coughing ND	No	1	30
Mayenne	23 May	None	NK	1	NK
Manche	23 May	NK	NK	1	NK
Jura	23 May	Coughing ND Pyrexia	No	6	50
Calvados	25 May	Pyrexia	NK	1	NK
Bas-Rhin	25 May	Coughing	NK	1	NK
Tarn	25 May	Coughing ND Pyrexia	NK	1	NK
Charente-Maritime	29 May	NK	NK	1	NK
Calvados	29 May	NK	NK	1	NK
Finistère	31 May	ND Pyrexia	NK	4	NK
Calvados	1 June	Pyrexia	NK	1	NK
Finistère	1 June	None	NK	1	NK
Aisne	4 June	NK	NK	2	NK
Orne	8 June	NK	NK	1	NK
Orne	13 June	NK	NK	2	NK
Orne	15 June	NK	NK	1	NK
Yvelines	15 June	Coughing ND	Yes	15	NK
Eure	14 June	Lethargy ND Pyrexia	NK	1	NK

Haute-Loire	18 June	Coughing ND Pyrexia	No	2	40
Ain	22 June	NK	NK	1	4
Allier	27 June	ND Pyrexia	Yes	1	7

NK= not known, ND = nasal discharge

For all cases above, positive diagnosis was confirmed by PCR on a nasopharyngeal swab

EQUINE INFECTIOUS ANAEMIA (EIA)

Table 11: International EIA cases reported for the second quarter 2018

Location	*Report Date*	*Clinical signs*	*Total affected*	*In-contacts*	*Sample*	*Diagnostics*	*Outcome*	*Source*
Alberta, Canada	2 May	Subclinical	1	NK	NK	NK	NK	CFIA
Mecklenburg-Vorpommern, Germany	4 April	NK	1	NK	NK	NK	NK	local authorities of Landkreis Ludwigslust-Parchim
Texas, USA	12 April	NK	1	NK	NK	NK	Euthanased	TAHC
Macedonia, Greece	13 April	Subclinical	1	NK	Blood	Serology (ELISA)	NK	OIE
Iowa, USA	17 April	NK	2	NK	NK	NK	Euthanased	Iowa Department of Agriculture
Texas, USA	14 May	NK	1	NK	NK	NK	NK	TAHC
Texas, USA	14 May	NK	1	NK	NK	NK	Euthanased	TAHC
Oregon, USA	1 June	Subclinical	1	ML	ML	ML	NK	Oregon Department of Agriculture Animal Health Laboratory
Texas, USA	14 June	NK	2	NK	NK	NK	Euthanased	TAHC
Texas, USA	14 June	NK	1	NK	NK	NK	Euthanased	TAHC
Texas, USA	14 June	NK	1	NK	NK	NK	Euthanased	TAHC
Texas, USA	14 June	NK	1	NK	NK	NK	Euthanased	TAHC
Texas, USA	14 June	NK	1	NK	NK	NK	NK	TAHC
Texas, USA	14 June	NK	1	NK	NK	NK	NK	TAHC

NK= not known, CIFA = Canadian Food Inspection Agency, OIE = World Organisation for Animal Health, TAHC = Texas Animal Health Commission

EQUINE INFLUENZA (EI)

Argentina

On 5 April 2018, the OIE reported an outbreak of EI in Argentina. The outbreak was confirmed in Mendoza on 20 March and further reports confirmed outbreaks in San Isidro, La Plata and Palermo. Further investigation into the outbreak in Mendoza identified a link with cases that occurred at the beginning of March 2018 in the locality neighbouring El Barreal, in the province of San Juan, Argentina. The contact of equines (mules and horses) with animals from Chile is frequent in San Juan during the moves to summer pastures that happen in areas of the Andes Mountains. The temporary association suggests an epidemiological relationship with the ongoing EI outbreaks in Chile reported in January 2018. Positive diagnoses were confirmed by PCR by the National Laboratory (SENASA).

Uruguay

On 12 June 2018, the OIE reported an outbreak of EI in Uruguay. The outbreak was confirmed in Salto and Paysandú on several stud farms. Following the disease situation reported in the region since the beginning of the year, the Official Veterinary Services of Uruguay have been vigilant and implemented weekly epidemiological surveillance actions urging equestrian institutions, private veterinarians and owners to have vaccinations up to date and to report any suspected cases of the disease. Other control measures include movement control inside the country, screening and quarantine of affected animals. Positive diagnoses were confirmed by PCR by Division of Veterinary Laboratories.

WEST NILE VIRUS (WNV)

Brazil

On 6 June 2018, the OIE reported a case of WNV in Espirito Santo, Brazil. The case presented with clinical signs on 25 April and was euthanased. There are three in contact animals. The positive diagnosis was confirmed by qPCR by Animal Virology Laboratory, Minas Gerais Federal University (Regional Laboratory). The official veterinary services are investigating notifications of mortality in equines associated with neurological signs in the north east region of the State of Espirito Santo. Complementary laboratory and epidemiological investigations are on-going, in collaboration with the national and local human health services, as well as alert communication actions to report suspicious cases. Control measures include surveillance within the containment zone, vaccination and no treatment of affected animals.

Further details on all the above and subsequent outbreaks can be found at http://www.aht.org.uk/cms-display/international-breeders-meeting.html

BACTERIOLOGY

disease report for the second quarter of 2018

A summary of the diagnostic bacteriology testing undertaken by different contributing laboratories is presented in Table 12. For Contagious Equine Metritis (CEM), 23 of the 23 BEVA approved laboratories in the UK contributed data.

No equine bacterial notifiable diseases have been confirmed in the UK during this second quarter of 2018.

Table 12: Diagnostic bacteriology sample throughput and positive results for the second quarter 2018

	Number of Samples Tested	Number Positive	Number of Contributing Laboratories
CEMO (HBLB) PCR	2039	0	9
CEMO (HBLB) culture	5230	0	22
CEMO (APHA) PCR	0	0	1
CEMO (APHA) culture	827	0	1
Klebsiella pneumoniae PCR[1]	1566	4	8
Klebsiella pneumoniae culture[1]	5710	5[#]	21
Pseudomonas aeruginosa PCR[1]	1917	22	8
Pseudomonas aeruginosa culture[1]	5710	29	21
Strangles[2] PCR	1696	116	6
Strangles culture	811	42	16
Strangles ELISA[3]	5336	519	5
Salmonellosis	461	18	16
Salmonellosis[4] (APHA)	9	7	1
MRSA	439	4	12
Clostridium perfringens (toxin by ELISA or imunochromatography)	259	5	5
Clostridium difficile (toxin by ELISA or imunochromatography)	319	26	9
Borrelia burgdorferi PCR	6	0	1
Borrelia burgdorferi ELISA	20	5	4
Rhodococcus equi culture	43	4	3
Rhodococcus equi PCR	56	10	2
Rhodococcus equi immunochromatography	6	3	3
Rhodococcus equi ELISA	27	21[##]	1
Burkholderia mallei (Glanders) (APHA) CFT	302	0	1
Lawsonia intracellularis PCR*	36	0	3
Lawsonia intracellularis IPMA	30	12[**]	1

CEM = contagious equine metritis (*Taylorella equigenitalis*), HBLB = HBLB approved laboratories, # = capsule type 1,2,5, PCR/culture[1] = reproductive tract samples only, Strangles[2] = *Streptococcus equi,* Strangles ELISA[3] = seropositivity may be attributed to disease exposure, vaccination, infection and carrier states, Salmonellosis[4]= Under the Zoonoses Order 1989, it is a statutory requirement to report and serotype positive cases for *Salmonella spp.* and a positive case may have repeat samples taken, MRSA = methicillin resistant *Staphylococcus aureus*, *Lawsonia intracellularis** = identified using PCR applied to faeces, IPMA = Immunoperoxidase monolayer assay ,. ## = seropositives include exposure to the virulent form of *Rhocococcus equi* or the presence of maternally derived antibodies, **= seropositives include vaccinated animals

APHA *Salmonella* results

Nine samples were submitted this quarter to the APHA and seven of these were positive for *Salmonella*. From the incidents involving isolates typed by the APHA, the serovars/phagetypes reported were three isolates of *S.* Typhimurium (DT12 x1 and RDNC x2) and single incidents of *S.* Enteritidis PT4, *S.* Bovismorbificans, *S.* Anatum and *S.* 3,10:y:-. *Salmonella* Typhimurium RDNC and *S.* Anatum is likely to be of wild bird origin. *S.* Bovismorbificans is primarily found in pigs and *S.* Enteritidis can be found in humans and poultry.

Table 13: APHA salmonella serovars/phagetypes classification for the second quarter 2018

Salmonella Spp	Number of Positives	Number of Tests	Number of Premises
3,10:Y:-	1	1	1
Anatum	1	1	1
Bovismorbificans	1	1	1
Enteritidis PT4	1	1	1
Typhimurium DT12	1	1	1
Typhimurium RDNC	2	2	2
Not Positive for Salmonella	0	2	2
Totals	**7**	**9**	**9**

Salmonella – All isolations of *Salmonella* from horses are reportable to APHA.

Under the Zoonoses Order 1989, the responsibility for reporting the isolation of *Salmonella* was placed on the laboratory carrying out the examination. In practice, reports of *Salmonella* isolations must be made to the Nominated Officer at one of the Veterinary Investigation Centres of the APHA or to a Regional Veterinary Lead in Scotland. A culture of the organism must be made available on request. Samples are typed by the APHA to classify serovars/phagetypes.

For more information from APHA about *Salmonella* in Great Britain, please see the 2016 *Salmonella* in livestock surveillance report https://www.gov.uk/government/publications/salmonella-in-livestock-production-in-great-britain-2016

INTERNATIONAL BACTERIAL DISEASE OCCURRENCE

Time period: 1 April to 30 June 2018

Potomac Horse Fever (*Neorickettsia risticii*) (PHF)

USA

On 1 June 2018, the Kentucky State Veterinarian confirmed a case of PHF in a four-year-old Thoroughbred filly in Bourbon County. The affected animal presented with profuse watery diarrhoea, lethargy and fever. Clinical signs began to resolve following treatment and the filly was reported to have made significant improvement.

On 5 June 2018, the Kentucky State Veterinarian confirmed a second case of PHF in the state. The affected animal was a one-year-old Thoroughbred filly that presented with acute watery diarrhoea of 48-hour duration, dehydration and fever. The filly's condition has since improved rapidly and was expected to recover. The latest case was on a different facility to that on which the first case of the disease in the state was reported previously.

On 25 June 2018, The Tennessee State Veterinarian confirmed a case of PHF in Davidson County, Tennessee. Additional details concerning this case were not available.

FOCUS ARTICLE
Antimicrobial resistance in horses

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Antimicrobial resistance (AMR) is a global problem with rising concern due to increasing resistance to commonly used antimicrobials (O'Neill et al., 2014). The issue is further compounded by a lack of new classes of antimicrobials being developed and authorised, especially for the horse. AMR is abundant across a wide range of equine pathogens, including, *Escherichia coli (E. coli)*, *Salmonella*, staphylococci, *Klebsiella, Pseudomonas* species and other opportunistic pathogens. Identification of resistance in high profile pathogens, especially potentially zoonotic bacteria in horses such as *E. coli* which produce extended spectrum lactamases (ESBL) (Maddox et al., 2011b, 2011a, 2011c), methicillin-resistant *Staphylococcus aureus* (MRSA) (Weese et al., 2006; Weese & Lefebvre, 2007) and multidrug resistant (MDR, resistance to ≥3 antimicrobial classes) *Salmonella* (Ward et al., 2005) has increased the attention on antimicrobial resistance in horses. There is strong evidence in human and veterinary studies in other species that antimicrobial use is associated with emergence and dissemination of resistance in ESBL-producing *Enterobacteriaceae* and MRSA (Wieler et al., 2011; Dunowska et al., 2011). In horses there is also increasing evidence of a similar association being present (Maddox et al., 2011b, 2011c; Weese & Lefebvre, 2007) .

Antimicrobial agents act by disrupting specific metabolic and normal functions of bacterial cells.
There are **4 predominant targets** for antimicrobial action (Neu, 1992):
- disruption of cell wall synthesis
- inhibition of DNA/RNA synthesis
- inhibition of protein biosynthesis
- interference with a vital metabolic pathway

The mechanisms through which bacteria can achieve resistance to antimicrobials can be grouped into **3 major categories** (Tenover, 2006):
- protection or alteration of the antimicrobial target site
- exclusion of the antimicrobial agent from the cell interior (via reduced cell permeability or efflux pump expulsion)
- production of antimicrobial inactivating enzymes

Bacterial resistance mechanisms can either occur due to a certain trait common to all bacteria of that group (i.e. intrinsic) or arise from acquired mechanisms found only in some members of a genus or species due to alteration of the bacterial genome (i.e. extrinsic). Acquired resistance can arise from endogenous mutations in chromosomal genes but it is more often achieved by exogenous horizontal acquisition of novel genetic elements. The transferable genetic material participating in exogenous resistance can involve plasmid encoded resistance genes, gene cassettes linked to integrons, transposons and other mobile genetic elements (Roupas & Pitton, 1974; Hall & Collis, 1995). These genetic elements can encode pumps for drug efflux, enzymes for antimicrobial inactivation, alternatives of the antimicrobial target site and as well as mechanisms which provide protection for the molecular target (Tran & Jacoby, 2002; Heikkilä et al., 1990). Exogenous exchange of genetic material may occur between differing strains of the same species or even across genera, and can occur via bacterial transformation (incorporation of exogenous DNA from dead bacteria), conjugation (transfer of plasmids), or transduction (DNA transferred by viral bacteriophages that infect bacteria) (Roupas & Pitton, 1974). Acquired antimicrobial resistance mechanisms are of particular concern, irrespective of their specific origin, as they allow both the emergence and rapid dissemination of resistance in formerly susceptible populations of bacteria. This report will focus on antimicrobial resistance in *E. coli*

Escherichia coli

E. coli is considered part of the normal gastrointestinal tract flora in horses (van Duijkeren et al., 2000) but despite a predominantly commensal nature, many strains of *E. coli* are capable of causing disease of both gastrointestinal and extra-intestinal sites (Lanz et al., 2003). Antimicrobial resistance is commonly encountered and β-lactam resistance is of particular concern. *E. coli* is intrinsically resistant to penicillin (as it is unable to penetrate their outer membrane) but there is widespread acquired resistance to other β-lactams (mostly via the production of inactivating lactamase enzymes such as TEM-1, TEM-2 and SHV-1, or AmpC β-lactamases, all encoded by various *bla* resistance genes (Hawkey, 2008; Datta & Kontomichalou, 1965). The extended spectrum β-lactam antimicrobials (including cefotaxime, ceftiofur and cefquinome) were developed to counter resistance seen to the early β-lactams. Resistance to these agents is conferred by bacterial production of ESBL enzymes (Pitout, 2010), many of which are simple mutations of the original TEM/SHV lactamases and only a small number of amino acid substitutions are required to extend their spectrum of resistance to include novel agents (Bradford, 2001). An emergence of a family of ESBL-enzymes that are distinct from SHV and TEM-types has occurred in the last two decades and now predominate within *E. coli* (Tzouvelekis et al., 2000). These enzymes preferentially hydrolyse the extended spectrum β–lactam cefotaxime and are consequently named cefotaximases (CTX-M) and have since been found in both humans and animals (Wieler et al., 2011).

Prevalence and epidemiology of antimicrobial resistant E. coli in horses

E. coli that are resistant to most antimicrobials currently authorised for use in horses in the UK have been identified in previous studies in both clinical (Vo et al. 2007) and commensal isolates (Vo et al., 2007; Dunowska et al., 2006). An increased prevalence of faecal carriage of antimicrobial resistant *E. coli* has been identified in hospitalised horses compared with those in the community and the same is true for MDR and ESBL-producing *E. coli* (Maddox et al., 2011c; Ahmed et al., 2010; Johns et al., 2012; Apostolakos et al., 2017).

The prevalence of faecal carriage of MDR and ESBL-producing *E. coli* has also been shown to increase significantly during hospitalisation (Maddox et al., 2011c; Williams et al., 2013) and some studies have reported a consistent association between antimicrobial exposure in hospitalised horses and increased risk of resistance in faecal *E. coli* (Ahmed et al., 2010; Maddox et al., 2011c). One study reported an association between overall hospital use of antimicrobials and increased prevalence of resistance, even in horses not actually receiving antimicrobials (Maddox et al., 2011c). Other studies have identified that hospitalisation (even without antimicrobial treatment) is a further risk factor (Bryan et al., 2010; Williams et al., 2013). Being stabled on the same yard as a recently hospitalised horse has also been associated with ESBL-producing *E. coli* carriage in the equine community (Maddox et al., 2011b) and the identification of continued faecal carriage of MDR bacteria by horses discharged from hospital suggest these horses may act as a reservoir (Johns et al., 2012).

Commensal carriage of ESBL-producing and MDR *E. coli* has been studied in detail (Maddox et al., 2011c) but their role in clinical infections has not been quantified. Recent publications have reported an increase in clinical infections in horses caused by MDR *E. coli* (Johns & Adams, 2015) and *E. coli* accounted for the majority of all surgical site infections (SSIs) following exploratory laparotomy in a recent hospital study (Isgren et al., 2017), but the source of these infections is not yet clear. Monitoring and surveillance of emerging resistance, both in commensals and pathogens, is essential in order to allow us to estimate the growing burden of antimicrobial resistance in the horse population. Apart from the data collated in the AHT/BEVA/DEFRA quarterly surveillance reports and the limited reporting in the UK-VARSS report (VMD, 2017) there is little research or large scale coordinated surveillance of clinical bacterial infections in horses within the UK.

A new surveillance initiative

We are currently undertaking a surveillance project of the AMR profiles of bacterial infections in horses using diagnostic laboratories submissions across a wide geographical range of equine practices. We will report on bacteria commonly associated with clinical infections and their patterns of AMR across most of the UK.

We have also undertaken a multi-centre study investigating risk factors for carriage of ESBL-producing bacteria across five equine referral hospitals in the UK. In this study we obtained daily faecal samples from equine inpatients as well as weekly environmental samples at these hospitals to determine which bacteria reside in the patient faecal flora and hospital environment. We are sampling SSIs from patients at these hospitals in an attempt to determine any link between faecal carriage of MDR *E. coli* and any role in SSI. Variations in prevalence of carriage and resistance phenotypes among hospitals may be a reflection of different patterns of antimicrobial usage and management. Further analysis will determine risk factors and the geographical distribution associated with carriage of MDR and ESBL-producing *E. coli* in this population.

Comparison of AMR in commensal *E. coli* versus those found in clinical infections and in the equine hospital environment will be key to our understanding of reservoirs of infection and transmission. Interventions can then be developed to help mitigate transmission, which will aid prevention of resistant infections in our equine population.

If any hospital has a suspected outbreak of MDR E. coli from surgical site infections we would be happy to receive and process samples **free of charge and feedback results**. For more information please contact Cajsa Isgren on cisgren@liverpool.ac.uk or Dr Gina Pinchbeck on ginap@liverpool.ac.uk / 0151 7946195

References

References are available on request, please contact maire.o'brien@aht.org.uk

Important note

The views expressed in this focus article are the author's own and should not be interpreted as official statements of APHA, BEVA or the AHT.

TOXIC AND PARASITIC

disease report for the second quarter of 2018

A summary of diagnostic toxicosis and parasitology testing undertaken by contributing laboratories is presented in Tables 14 and 15 respectively. Results for toxicosis are based on histopathologically confirmed evidence of disease only (where applicable).

Table 14: Diagnostic toxicosis sample throughput results for the first quarter 2018

	Number of Samples Tested	Number Positive	Number of Contributing Labs
Grass Sickness	17	10	2
Hepatic toxicoses	42	11	1
Atypical myopathy/Seasonal Pasture Associated Myopathy	3	2	2

Table 15: Diagnostic parasitology sample throughput and positive results for the first quarter 2018

	Number of Samples Tested	Number Positive	Number of Contributing Labs
Endoparasites			
Ascarids	4774	60	18
Strongyloides	5825	588	16
Strongyles (large/small)	6545	2799	22
Tapeworms ELISA serum	0	0	0
Tapeworms ELISA saliva	4793	1420	1
Tapeworms Faecal exam	3563	20	12
Dictyocaulus arnfieldi	70	0	1
Oxyuris equi	746	0	12
Fasciola hepatica	500	8	10
Coccidia	1138	4	8
Cryptosporidia	178	12	9
Theileria equi cELISA	341	9	2
Babesia caballi cELISA	341	8	2
Theileria equi (APHA) CFT	115	0	1
Theileria equi (APHA) IFAT	164	22	1
Theileria equi (APHA) cELISA	142	3	1
Babesia caballi (APHA) CFT	115	0	1
Babesia caballi (APHA) IFAT	164	12	1
Babesia caballi (APHA) cELISA	142	1	1
Dourine(APHA) IFAT	0	0	1
Dourine (APHA) CFT	282	0	1
Ectoparasites			
Mites	247	0	9
Lice	249	19	8
Ringworm	337	69	14
Dermatophilus	39	7	6
Candida	77	5	5

CFT = Complement Fixation Test - CFT suspect/positive samples are tested by IFAT test, IFAT = Indirect Fluorescent Antibody Test, cELISA = competitive Enzyme-linked immunosorbent assay

Grass sickness surveillance data for the second quarter 2018

The nationwide Equine Grass Sickness surveillance scheme (http://www.equinegrasssickness.co.uk/) was established in spring 2008 to facilitate the investigation of changes in geographical distribution and incidence of the disease in Great Britain. Data gathered by this scheme is collated in a strictly confidential database.

A total of six cases of equine grass sickness (EGS) were reported during the second quarter of 2018, of which one case occurred in April, one case in May and four cases in June. These figures are lower than expected for the time of year, where previously the highest number of cases seen per month each year has been in May, with an average of 30 reported each May since 2008.

Three cases were reported in England, one in Scotland and two in Wales. Of the six cases, three premises reported a history of EGS, one premises in England, one in Scotland and one in Wales.

The cases comprised of four mares and two geldings, with a median age of four years (range 1-9 years). Affected breeds were Cob (n=2), Native (n=2) and two cross breeds.

Type of EGS was given for five of the six cases; three were diagnosed with acute EGS and two with sub-acute EGS. Diagnostic information was provided for all reported cases, of which five cases were diagnosed on clinical signs alone and one case was diagnosed by histopathological confirmation of biopsies taken *post-mortem* (ileum, paravertebral trunk and mesenteric ganglia).

The Peak Season for Equine Grass Sickness - Early Summer: A Case Report

Introduction

Equine grass sickness (EGS), also known as equine dysautonomia, is a frequently fatal neurodegenerative disease of horses, donkeys and mules (Newton, et al., 2004; Girling, et al., 2017). As suggested in the name, the disease is seen predominantly in horses with access to grazing, accounting for >99% of cases (Newton et al., 2010; Wylie et al., 2011).

Clinical presentation of the disease includes an increased heart rate, muscle fasiculations, patchy sweating, dysphagia, reduced intestinal motility, signs of colic and weight loss (Doxey et al., 1991; Milne., 1996).

Horses presenting with the acute and subacute form of the disease will invariably die or require euthanisia (Wylie et al., 2009). Treatment for select cases of horses with chronic EGS may be successful through intensive nursing and monitoring. Recent analysis of the disease has found that survival rates are now at 16% for chronic cases (Wylie et al., 2011).

Horses of all ages can be affected by EGS, but young horses between the ages of two and seven years-old have a higher risk of contracting the disease (Wylie et al., 2009).

The high risk EGS season lies in early summer, with the largest number of cases being reported in May.

Case Presentation and History

A two-year-old Welsh mountain pony filly presented with clinical signs consistent with EGS on 5 June 2018 in Suffolk, UK. The filly had muscle fasiculations of the hindquarters, a short gait, rhinitis sicca, tachycardia (consistently 80bpm), rectal temperature of 38.3˚C, ptosis of both upper eyelids and absence of borborygmi. Rectal examination revealed a very large impaction within the pelvic flexure and faeces in the rectum were clay-like.

The filly had been on the premises for a year and a half in total and had been grazing the affected paddock for four weeks before falling ill. Prior to that, the field had been rested over winter with adequate grass coverage and the field had been harrowed in the spring. Droppings were removed via mechanical sweeping six days prior to the filly falling ill. There had been a spell of hot dry weather followed by light rain in the preceding days. The farm had a history of EGS.

Diagnosis
Microscopic findings of the ileum included; paucity of neurons of the submucosa and myenteric plexuses and concomitant mild increased number of glial cells. Paravertebral trunk and mesenteric ganglia findings included; neurons characterized by multifocal chromatolysis, hypereosinophilia and cytoplasmic vacuolization, with concomitant increased number of glial cells.

A summary of ileal neuronal loss and neuronal degeneration of the paravertebral trunk with necrosis and gliosis was reached, consistent with EGS.

Outcome
Euthanasia and post-mortem. The five in-contacts were removed from the field and were closely monitored.

Discussion

Previous epidemiological studies have highlighted risk factors for EGS development (Newton *et* al., 2004; Wylie *et al*., 2009; Wylie *et al*., 2011) and a number of these were present in the history and presentation of this case. Horses aged between two and seven years old are at a greater risk of developing EGS, the affected animal fell into this young age category. The premises has a history of EGS which increases the risk of further cases occurring. Differing management practices can also increase the risk of EGS occurrence such as continuous turnout and movement onto new pastures, the affected animal had been moved to a new pasture within the preceding four weeks and was turned out all the time. Managing pastures with mechanical dropping removal aids such as sweepers has been found to increase the risk of EGS, thought to be a result of paddock and soil disturbance whilst sweeping, the farm the affected animal was housed at regularly swept the paddock. Weather conditions can also increase the risk of EGS occurring alongside the time of year. The affected animal fell ill in June, which is within the high risk period of early summer and the prevailing weather conditions had been predominantly dry, followed by light rain. Previous studies have found that an increase in cases of EGS occurred after two weeks of predominantly dry weather (Wood *et al*., 1998). Future preventative measures have been put in place at the premises, including resting fields for a period after mechanical sweeping.

References
References are available on request, please contact maire.o'brien@aht.org.uk

POST MORTEM EXAMINATIONS

report for the second quarter of 2018

The caseload of post-mortem examinations reported below have been obtained from one UK Veterinary School and six of the other contributing laboratories to this report.

East Anglia

A total of 41 cases were examined by post mortem.

A total of 17 aborted fetuses and fetal membranes were examined.

Table 16: Summary of post-mortem findings for aborted fetuses in East Anglia for the second quarter 2018.

Post Mortem Diagnosis	Total	Comments
Placentitis	4	Placentitis confirmed to be secondary to bacterial infection, with aerobic cultures reported in one case, isolating E. coli
Equine Herpes Virus-1	6	Confirmed by histopathology and PCR on fetal and placental tissues
Placentopathy	1	Allantois had multifocal villous atrophy and multifocal squamous metaplasia. Villi were variably blunted, multifocally lost, with interspersed trophoblastic necrosis and squamous metaplasia
Placental Damage	1	Presence of placental damage, most likely secondary to terminal hypoxia
Placental Insufficiency	2	In the first case, histological findings supported the gross assessment of placental pathology and probable placental insufficiency. Given the extent of placenta grossly affected by the histologically confirmed changes, placental insufficiency was considered the most likely cause of foetal death and abortion. In the second case, inappropriate mineralisation was present over extensive regions, resulting in placental insufficiency
Umbilical Cord Torsion	1	None
Excessive Umbilical Cord Length	1	Intrapartum death, suspected to have resulted in cord compromise at foaling
No final diagnosis*	1	Infectious causes ruled out

PCR and histopathology was performed to screen for Equine Herpes Virus infection in all cases.

*Where cases had no final diagnosis reached, hypotheses were made for each case with the intention for interpretation by the submitting veterinarian, relating post mortem findings to concurrent clinical history to affirm the most likely conclusion. For every post mortem, congenital and common infectious causes have been ruled out.

Three cases of neonatal death were examined. One case was found to have dysmaturity and sepsis associated with in-utero funisitis (inflammation of umbilical cord). One case examined was a sudden death with uncertain aetiology. One case was a sudden death with severe acute pulmonary oedema, suspected to be as a result of cardiogenic issues or possibly from anaphylaxis.

Nine gastrointestinal cases were examined. One case had acute gastric rupture and associated peritonitis. One case was found to have rupture of the ileum and associated peritonitis. Four cases were diagnosed with severe necrotising enteritis and associated peritonitis and one of these cases concurrently had nephritis, pneumonia and pulmonary arterial thromboemboli. One case of small intestinal volvulus was examined. Two cases with large intestinal pathology were examined and a diagnosis of caecal rupture and associated acute septic peritonitis was made in both.

One hepatic disease case was examined and found to have a hepatopathy consistent with ragwort toxicity.

Two musculoskeletal cases were examined. In one case, a diagnosis of severe damage of the distal phalanx made, with osteomyelitis and a comminuted fracture of the distal phalanx, locally extensive, severe, chronic tenosynovitis and suspect bone loss of the navicular bone. The macroscopic examination confirmed the clinical diagnosis of severe damage of the distal phalanx and the adjacent articular and periarticular structures. The other case was found to have a pelvic fracture and secondary haemoabdomen.

Two neurological cases were examined. In one, a diagnosis of Wobbler syndrome was made. Narrowing of the vertebral canal was detected on mid-sagittal section of the spine, at the level of C3-C4 and C6-C7. The cervical spinal cord in these areas was compressed mainly secondary to upward bending of the floor of the spinal canal. Exacerbation of the compression was produced by ventral flexion of the spine. In the other case, a severe encephalomyelitis was found. Histological findings included; spinal: haemorrhagic with perivascular mononuclear cuffing, predominantly grey matter, and brain: multifocal necrosis and suppurative foci and mononuclear perivascular cuffing. The case was negative for EHV, WNV, Borna disease and Listeria.

Four respiratory cases were examined. One case was diagnosed with Rhodococcal pneumonia. One case had a severe acute diffuse interstitial and bronchointerstitial pneumonia with no aetiological agent identified. One case had a severe septic pleuropneumonia. The final case was an anaesthetic-related death.

One case was examined for an unexpected death, the case presented with dysphagia. No diagnosis was reached and there was no specific aetiology found.

Two cases of sudden death were examined. In the first, there were histopathologically detected myocardial changes but these were minimal and unlikely to be the only cause of the sudden death. For this reason potential concomitant damage and alteration of the conduction system may have possibly played a role. The post-mortem examination in this case could not determine the precise cause of sudden death but a primary acute cardiac insufficiency is the most likely precipitating cause. In the second case, mild inflammatory changes of the myocardium could have caused alteration of the conduction system causing a deadly arrhythmia, but diagnosis was not definitive.

Home Counties

A total of 16 cases were examined.

One case of abortion was examined and diagnosed with placentitis. The placenta had necrosuppurative placentitis with intra-lesional gram-positive cocci. A positive culture isolated *Streptococcus zooepidemicus* and *Staphylococcus aureus*.

Three cardiac cases were examined. The first was found to have petechiaton and severe acute multifocal extensive, monophasic acute degeneration and necrosis of the right atrial and ventricular epicardium. The second case had a marked serosanguinous effusion of the pleural and peritoneal cavities secondary to cardiac failure, with the heart displaying multifocal interstitial fibrosis. The final case was diagnosed with a thrombus affecting the deep circumflex iliac artery with secondary acute, marked haemoabdomen.

Six cases of gastrointestinal disease were examined. There was one case that had a markedly impacted and distended stomach with no obvious precipitating cause. One case was found to have macroscopic segmental oedema and mural thickening of the small intestine, caecum and colon and ulcerative colitis. *Salmonella* was isolated from the small intestine and serotyping identified the isolate as *Salmonella* typhimurium I B. One case was found to have very large numbers of adult Parascaris equorum worms within the intestine. One case was examined for colic but no cause of the colic was identified, a mild abdominal effusion was present. Two cases were diagnosed with mesenteric lipomas causing segmental infarction and necrosis of the small intestine and mid-jejunum.

One hepatic case was examined and found to have a diffusely firm and nodular liver with severe, chronic bridging fibrosis, biliary hyperplasia with regenerative nodules, hepatocellular megalocytosis, vacuolar degeneration and necrosis.

Two neoplastic cases were examined. One was diagnosed with disseminated haemangiosarcoma affecting the vertebral body, heart, kidney, liver, spleen and left ovary. The other case was diagnosed with multifocal lymphoma

affecting the intestine, jejunum and colon.

One reproductive case was examined and diagnosed with a non-healing scrotal wound with purulent material, fibrinous deposition and marked swelling.

Two welfare cases were examined. Both were found to be emaciated with diffuse muscle atrophy and evidence of parasitism.

Northern England
A total of one case was examined.

One musculoskeletal case was examined and diagnosed with a right ileal wing fracture.

Northern Ireland
A total of two cases were examined.

One case of neonatal death was examined and a diagnosis of sepsis made. The liver and adrenal glands contained numerous bacteria and bacterial culture isolated *Pasteurella multocida.*

One case of lymphoreticular disease was examined and a diagnosis of mesenteric supprative lymphadenopathy made. Bacterial culture isolated *Pasteurella multocida.*

Scotland
A total of 17 cases were examined.

One neonatal death case was examined and diagnosed with patent ductus arteriosus and pulmonary atelectasis.

Seven cases of gastrointestinal disease were examined. One was diagnosed with an ileocaecal intussusception. One case had a diagnosis of marked lymphoplasmacytic and eosinophilic enteritis with erosive typhlitis of moderate severity, mild granulomatous colitis with intralesional nematodes (cyathostomes), cestode infestation (*Anoplocephala perfoliata*) and multiple chronic renal infarcts. One case had a perforation at the pelvic flexure of the large colon with associated peritonitis and pelvic cellulitis. One case was a six week old male Warmblood with an intestinal motility disorder and a right dorsal impaction was identified, histopathology was not performed. There were three cases of equine grass sickness all with the findings of caecocolic impaction with small intestinal and gastric reflux. Histopathology was not performed.

Four musculoskeletal cases were examined. One was found to have septic arthritis of the tarsus. One case was diagnosed with a right hind fracture. One case was diagnosed with a penetrating hoof injury. There was one case of traumatic injury with a fracture of thoracic vertebral body (T4) and associated fractures of costovertebral junctions (right T4 and left T5).

One neoplastic case was examined and diagnosed with a pancreatic mass and secondary haemabdomen.

One ophthalmic case was examined which had a clinical history of blindness, no significant findings were made on post-mortem examination.

One respiratory case was examined and diagnosed with bronchopneumonia and pleurisy.

Two cases of sudden death were examined and both were found to have a fracture of one thoracic vertebral body, bilateral rib fractures and rupture of the aorta with secondary haemothorax.

South West England
A total of five cases were examined.

One cardiac case was examined and diagnosed with mitral valve degeneration.

One case suffering from gastrointestinal disease was examined and diagnosed with a small colon impaction.

One case suffering from neoplasia was examined and diagnosed with an oral papilloma.

Two cases with dental disease were examined and one had a chronic focal ulcer and the other had severe dental disease.

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Agri-Food and Biosciences Institute of Northern Ireland
Animal Health Trust Diagnostic Laboratory Services
Animal and Plant Health Agency
Austin Davis Biologics Ltd
Axiom Veterinary Laboratories Ltd.
Biobest Laboratories Ltd.
BioTe Veterinary Laboratories.
B & W. Equine Group Ltd.
Carmichael Torrance Diagnostic Services
Chine House Veterinary Hospital
The Donkey Sanctuary
Donnington Grove Veterinary Group
Endell Veterinary Group Equine Hospital
Hampden Veterinary Hospital
IDEXX Laboratories
JSC Equine Laboratory
Lab Services Ltd.
Liphook Equine Hospital
Minster Equine Veterinary Clinic
NationWide Laboratories
Newmarket Equine Hospital
Oakham Veterinary Hospital
Rainbow Equine Hospital
Rossdales Laboratories
Royal Veterinary College
Sussex Equine Hospital
Three Counties Equine Hospital
Torrance Diamond Diagnostic Services (TDDS)
University of Glasgow
Valley Equine Hospital

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We would welcome feedback including contributions on focus articles and/or case reports to the following address:

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